

**TAB TERMINAL****CROSS-REFERENCE TO A RELATED APPLICATION**

This nonprovisional application claims priority under  
5 35 U.S.C. § 119(a) on Patent Application No. 2003-123943  
filed in Japan on April 28, 2003, the entire contents of  
which are hereby incorporated by reference.

**BACKGROUND OF THE INVENTION****10 Field of the Invention**

The present invention relates to a tab terminal  
mounted on a printed circuit board.

**Description of the Related Art**

In electrical equipment, a printed circuit board is  
15 widely used, which is formed with a conductor pattern and  
to which various electrical circuit component parts are  
mounted. Also mounted to the printed circuit board is a  
tab terminal that is used to connect the conductor pattern  
with an external electrical circuit. Typically, the tab  
20 terminal comprises contact portions soldered to the  
conductor pattern, and a fitting portion to which a  
receptacle terminal is fitted. The receptacle terminal is  
connected through an electric wire to an external  
electrical circuit (refer to JP-A-2002-324606).

25 The aforementioned conventional tab terminal is  
designed to be mounted on a printed circuit board in such a  
manner that it extends vertically from a surface of the  
printed circuit board, thus making the height dimension of  
a parts mounting space on the printed circuit board large.  
30 In addition, as mentioned above, the receptacle terminal is  
fitted to the fitting portion of the tab terminal and the  
wire is connected to the tab terminal, and therefore, the  
parts mounting space on the printed circuit board is  
required to have a height dimension larger than at least a

total length of the tab terminal and receptacle terminal. In the case of equipment where printed circuit boards are disposed in a multi-stage fashion, the distance between the printed circuit boards must be increased, if the printed circuit board require a parts mounting space which is large in height dimension. For these reasons, equipment comprised of one or more printed circuit boards mounted with the conventional tab terminal becomes large sized. In addition, the conventional tab terminal is arranged to be mounted on the printed circuit board, with its lower leg portions inserted into holes formed in the printed circuit board. Thus, a mounting operation of the tab terminal to the printed circuit board is cumbersome, and automatic mounting using a mounter requires complicated procedures.

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#### SUMMARY OF THE INVENTION

An object of this invention is to provide a tab terminal capable of being mounted in a parts mounting space on a printed circuit board which is small in height.

20 According to the present invention, there is provided a tab terminal adapted to be mounted on a printed circuit board, which comprises a plate-like tab terminal body; an extension portion formed integrally with the tab terminal body so as to extend from one end edge of the tab terminal body in a longitudinal direction of the tab terminal body, the extension portion being adapted to be connected with an electrical connecting part; first and second side wall portions formed integrally with the tab terminal body so as to extend from opposite side edges of the tab terminal body in a height direction of the tab terminal, respectively; and first and second contact portions formed integrally with the first and second side wall portions so as to extend from distal end edges of the first and second side wall portions in substantially parallel to the tab terminal body, respectively, the tab terminal being fixedly

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connected at the first and second contact portions to the printed circuit board.

In the present invention, the first and second contact portions may be arranged to extend at an angle slightly smaller than right angles with respect to the first and second side wall portions, respectively. The extension portion of the tab terminal may be formed so that a receptacle terminal serving as the electrical connecting part is fitted to the extension portion. The first and second contact portions may be soldered to solder portions of a conductor pattern formed in the printed circuit board. The tab terminal body may be formed with a picked-up portion to which a pickup such as a suction nozzle of a mounter is accessible. The first and second side wall portions may have a height dimension such that a gap is formed between a surface of the printed circuit board to which the tab terminal is mounted and an adjacent surface of the electrical connecting part connected to the extension portion of the tab terminal.

The tab terminal of this invention is fixedly connected at its first and second contact portions to the printed circuit board in such a manner that the tab terminal body and the extension portion extend along the printed circuit board so as to apart therefrom at a distance corresponding to the height dimension of the first and second side wall portions. Then, an electrical connecting part such as a receptacle terminal is connected to the extension portion of the tab terminal. In this manner, the tab terminal of this invention is mounted to the printed circuit board so as to extend therealong, and the height dimension of the tab terminal (that of the first and second side wall portions thereof) can be made small so long as the electrical connecting part connected to the extension portion of the tab terminal does not interfere with the printed circuit board to which the tab terminal is

mounted. Thus, the height dimension of the tab terminal, and by extension the height dimension of the parts mounting space on the printed circuit board, can be reduced as compared to the conventional tab terminal mounted

5 vertically to the printed circuit board. In addition, the extension portion of the tab terminal, to which the electrical connecting part is connected, extends longitudinally of the tab terminal body, and therefore, the electrical connecting part connected to the extension  
10 portion also extends along the printed circuit board. In this manner, according to the tab terminal of this invention, the electrical connecting part is disposed along the printed circuit board, and therefore, the height dimension of the parts mounting space on the printed  
15 circuit board can be greatly reduced as compared with the case where the electrical connecting part is disposed vertically with respect to the printed circuit board. This contributes to downsizing, especially thinning, of electrical equipment that is constructed using one or more  
20 printed circuit boards.

With the tab terminal according to the preferred embodiment where the first and second contact portions individually extend at an angle slightly smaller than right angles with respect to the first and second side wall  
25 portions, when the tab terminal is fixedly connected to the printed circuit board by soldering the first and second contact portions to solder portions of the printed circuit board, molten solder adequately enters into gaps between surfaces of the contact portions and surfaces of the solder  
30 portions. This ensures that the tab terminal is fixedly connected to the printed circuit board with reliability.

According to the preferred embodiment where the tab terminal body is formed with the picked-up portion, the tab terminal can be surface mounted to the printed circuit  
35 board using a mounter, thus improving the efficiency of

mounting operation.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully  
5 understood from the detailed description given herein below  
and the accompanying drawings which are given by way of  
illustration only, and thus, are not limitative of the  
present invention, and wherein:

Fig. 1 is a perspective view showing a tab terminal  
10 according to an embodiment of this invention;

Fig. 2 is a plan view of the tab terminal shown in Fig.  
1;

Fig. 3 is a side view of the tab terminal;

Fig. 4 is a front view of the tab terminal; and

15 Fig. 5 is a perspective view showing the tab terminal  
in a state where it is surface mounted to a printed circuit  
board.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 In the following, a tab terminal according to one  
embodiment of this invention will be explained in detail.

As shown in Figs. 1-4, the tab terminal 1 of this  
embodiment comprises a plate-like tab terminal body 1a, an  
extension portion 1b extending from one end edge of the tab  
25 terminal body 1a longitudinally of the tab terminal body 1a,  
first and second side wall portions 1d respectively  
extending from opposite side edges of the tab terminal body  
1a in the height direction of the tab terminal 1; and first  
and second contact portions 1e respectively extending from  
30 distal end edges of the side wall portions 1d in  
substantially parallel to the tab terminal body 1a. The  
extension portion 1b, the side wall portions 1d and the  
contact portions 1e are formed integrally with the tab  
terminal body 1a. The tab terminal 1 is fabricated by

stamping a thin copper plate having a thickness of about 0.5 mm, which is excellent in electric conductivity and is easily stamped out.

As shown in Fig. 5, the tab terminal 1 is arranged to  
5 be mounted on a printed circuit board 3. The tab terminal body 1a of the tab terminal 1 is formed with a picked-up portion 1h, so that the tab terminal 1 can be mounted to the printed circuit board 3 by using a mounter (not shown) having a pickup such as a suction nozzle which can access  
10 to the picked-up portion 1h.

The printed circuit board 3 has a surface 3a thereof formed with a conductor pattern 4 including solder portions 4a. The tab terminal 1 is soldered at its first and second contact portions 1e to the solder portions 4a of the  
15 printed circuit board 3, whereby the tab terminal 1 is fixedly connected to the printed circuit board 3. The first and second contact portions 1e are disposed so that their distal ends face with each other with a spacing. These contact portions 1e form an angle that is slightly  
20 smaller than right angles with respect to the first and second side wall portions 1d, respectively. More specifically, when the first and second contact portions 1e are placed on the solder portions 4a of the printed circuit board 3, outer faces (contact faces) 1f of the contact  
25 portions 1e obliquely extend at a small angle  $\theta$  of about 10 degrees with respect to the surface (shown by symbol S in Fig. 4) of the solder portions 4a in the direction away from the solder portions, so that a wedge-shaped gap g is defined between the contact faces 1f and the surface S of  
30 the solder portions 4a.

In this embodiment, the extension portion 1b extends in the longitudinal direction of the tab terminal body 1a in flush with the tab terminal body 1a, as shown in Figs. 1 and 2 in which reference numeral 1c denotes an upper face

of the tab terminal body 1a. As shown in Fig. 5, the extension portion 1b is formed to have a width narrower than the tab terminal body 1a, has a chamfered tip end 1g, and is positioned at a predetermined height with respect to the contact portions 1e, so that a receptacle 5 as an electrical connecting part may easily be fitted to the extension portion 1b with reliability. In this connection, the first and second side wall portions 1d of the tab terminal 1 have a height dimension permitting a gap to be defined between a bottom face of the receptacle terminal 5 fitted to the extension portion 1b of the tab terminal 1 and the surface 3a of the printed circuit board 3 to which the tab terminal 1 is mounted. One end of a wire 6 is clamped by and connected to the receptacle terminal 4, and another end of the wire 6 is connected to an external electrical circuit, not shown.

The tab terminal 1 having the aforementioned construction is picked up by suction at its picked-up portion 1h by means of a mounter (not shown) having a suction nozzle and is transported toward the printed circuit 3. Then, as shown in Fig. 5, the tab terminal 1 is placed on the printed circuit board 3, with the contact portions 1e respectively aligned with the solder portions 4a of the printed circuit board 3. At this time, the extension portion (fitting portion) 1b of the tab terminal 1 is disposed to be away from and in parallel to the surface 3a of the printed circuit board 1.

Then, the contact portions 1e of the tab terminal 1 are soldered to the solder portions 4a. On this occasion, the contact faces 1f of the contact portions 1e extend at a small angle  $\theta$  to form wedge-like gaps g with respect to the surfaces S of the solder portions 4a, and therefore, molten solder adequately enters into the wedge-like gaps g, whereby the contact portions 1e are soldered to the solder

portions 4a with reliability. Thus, the tab terminal 1 is surface mounted onto the printed circuit board 3.

Thereafter, the receptacle terminal 5 is fittedly connected to the extension portion (fitting portion) 1b of the tab

5 terminal 1.

Since the fitting portion 1b is disposed in parallel to the surface 3a of the printed circuit board 3, the receptacle terminal 5 is disposed to be in parallel to the printed circuit board 3. Thus, the tab terminal 1 can be  
10 mounted to the parts mounting space on the printed circuit board 3 which is small in height dimension. In other words, the height dimension of the parts mounting space on the printed circuit board 3 can be reduced. This makes it possible to downsize and thin down electrical equipment.

15 The present invention is not limited to the foregoing embodiment, and may be modified variously.

For instance, although the tab terminal of the embodiment has its extension portion arranged to be fitted with a receptacle terminal, electrical connecting part  
20 other than the receptacle terminal may be connected to the extension portion. It is not essentially required that the tab terminal is mounted to the printed circuit board using a mounter.